

REMARKS/ARGUMENTS

Favorable reconsideration of this application as presently amended and in light of the following discussion is respectfully requested.

Claims 1-20 are presently active in this application, Claims 1-3 and 12-14 have been amended and Claims 19 and 20 added by the present Amendment, and Claims 4-7 and 10 having previously been withdrawn as directed to a non-elected invention.

In the outstanding Office Action, Claims 3 and 14 were rejected under 35 U.S.C. §112, second paragraph, as being indefinite; Claim 1 was rejected under 35 U.S.C. §102(b) as being anticipated by Smith et al. (US 5,311,095, hereinafter called “Smith”); Claims 2, 3, 12, 13 and 16-18 were rejected under 35 U.S.C. §103(a) as being unpatentable over Smith. However, Claims 8, 9, 11 and 15 were allowed.

Applicants acknowledge with appreciation the allowance of Claims 8, 9, 11 and 15.

In response to the rejection under 35 U.S.C. 112, 2nd para., Claims 3 and 18 have been amended in line with the Examiner's suggestion. Thus, it is believed that the rejection under 35 U.S.C. §112 has been overcome.

In light of the several grounds for rejection on the merits, Claims 1, 2, 12 and 13 have been amended to clarify the claimed invention and thereby more clearly patentably define over the cited prior art. No new matter has been added.

By way of further explanation of the claimed invention, Claims 1, 2, 12 and 13 are directed to one-dimensional or two-dimensional array ultrasonic probe which does not cause processing errors during cutting. Therefore, amended Claim 1 recites an ultrasonic probe comprising: (i) a plurality of single-crystal piezoelectric members; (ii) a plurality of lower resin layers each of which is formed on a lower surface of each of the piezoelectric members and each of which has smaller acoustic impedance than the piezoelectric members, a cutting characteristic and an electrical conductivity so as to function as an electrode, the lower

surface being an opposite side of an acoustically emitting side; and (iii) a backing member which supports the single-crystal piezoelectric member.

Amended Claim 2 recites an ultrasonic probe comprising: (i) a plurality of 1-3 or 2-2 type composite piezoelectric members formed of solution-based single-crystal containing at least plumbum titanate; (ii) a plurality of lower resin layers each of which is formed on a lower surface of the piezoelectric members and each of which has smaller acoustic impedance than the piezoelectric members, a cutting characteristic and an electrical conductivity so as to function as an electrode, the lower surface being an opposite side of an acoustically emitting side; and (iii) a backing member which supports the single-crystal piezoelectric member.

Amended Claim 12 recites an ultrasonic probe comprising: (i) a plurality of single-crystal piezoelectric members; (ii) a plurality of lower resin layers each of which is formed on a lower surface of the piezoelectric members and each of which has smaller acoustic impedance than the piezoelectric members, a cutting characteristic, an electrical conductivity so as to function as an electrode, an acoustic impedance of 2×10^6 g/m² to 10×10^6 g/m² so as to function as an acoustic matching layer, the lower surface being an opposite side of an acoustically emitting side; and (iii) a backing member which supports the single-crystal piezoelectric member.

Amended Claim 13 recites an ultrasonic probe comprising: (i) a plurality of 1-3 or 2-2 type composite piezoelectric members formed of solution-based single-crystal comprising at least plumbum titanate; (ii) a plurality of lower resin layers each of which is formed on a lower surface of the piezoelectric members and each of which has smaller acoustic impedance than the piezoelectric members, a cutting characteristic, an electrical conductivity so as to function as an electrode, an acoustic impedance of 2×10^6 g/m² to 10×10^6 g/m² so as to

function as an acoustic matching layer; and (iii) a backing member which supports the single-crystal piezoelectric member.

On the other hand, Smith discloses an ultrasonic probe in which a signal line is pulled out from each ultrasonic element of the ultrasonic probe, wherein the ultrasonic vibration elements are arranged in a two-dimensional matrix.

In comparison with Smith, amended Claims 1, 2, 12 and 13 recite an ultrasonic probe comprising: (i) a plurality of piezoelectric members; (ii) a plurality of lower resin layers each of which is formed on a lower surface of the piezoelectric member and each of which has smaller acoustic impedance than the piezoelectric member, a cutting characteristic and an electrical conductivity so as to function as an electrode; and (iii) a backing member which supports the piezoelectric members.

In contrast, Smith does not disclose an ultrasonic two-dimensional array probe having a backing member. If such a backing member were to be combined with the two-dimensional array disclosed by Smith, a signal line from each ultrasonic vibration element would have to be pulled out through the backing member, which would be a complicating structure. This would be problematic to Smith because the object of the Smith is to determine how to pull out a signal line from each ultrasonic vibration element of an ultrasonic probe, and consideration is not given to where a backing member should be provided. Thus, a backing member cannot be simply combined with the two-dimensional array probe disclosed by Smith.

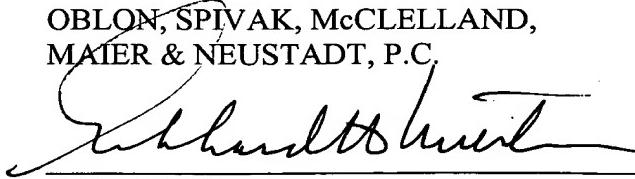
Further, since the object of Applicants' invention and that of Smith are different, there is no motivation in the prior art itself to modify the structure taught by Smith. Accordingly, it is respectfully submitted that the claimed invention defined by the amended claims is patentably distinguishing over Smith.

Newly submitted Claims 19 and 20 recite an ultrasonic probe comprising: (i) a plurality of piezoelectric members; (ii) a plurality of lower resin layers each of which is formed on a lower surface of the piezoelectric members and each of which has smaller acoustic impedance than the piezoelectric members, a cutting characteristic and an electrical conductivity so as to function as an electrode, the lower surface being an opposite side of an acoustically emitting side; and (iii) a plurality of wires each of which is arranged on each of the lower resin layers, extends along an entire length of each of the piezoelectric members and is connected to each of the lower resin layers along the longitudinal direction of each of the piezoelectric members. It is respectfully submitted that Smith and Finsterwald et al. (US5423220), also of record, do not disclose an ultrasonic probe having such structure. Accordingly, it is respectfully submitted that new Claims 19 and 20 also patentably distinguish over the cited prior art.

Consequently, in view of the present amendment and in light of the above comments, the pending claims are believed to be patentably distinguishing over the cited prior art and in condition for formal allowance. An early and favorable action to that effect is respectfully requested.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.



Eckhard H. Kuesters
Attorney of Record
Registration No. 28,870

Customer Number
22850

Tel: (703) 413-3000
Fax: (703) 413 -2220
(OSMMN 06/04)